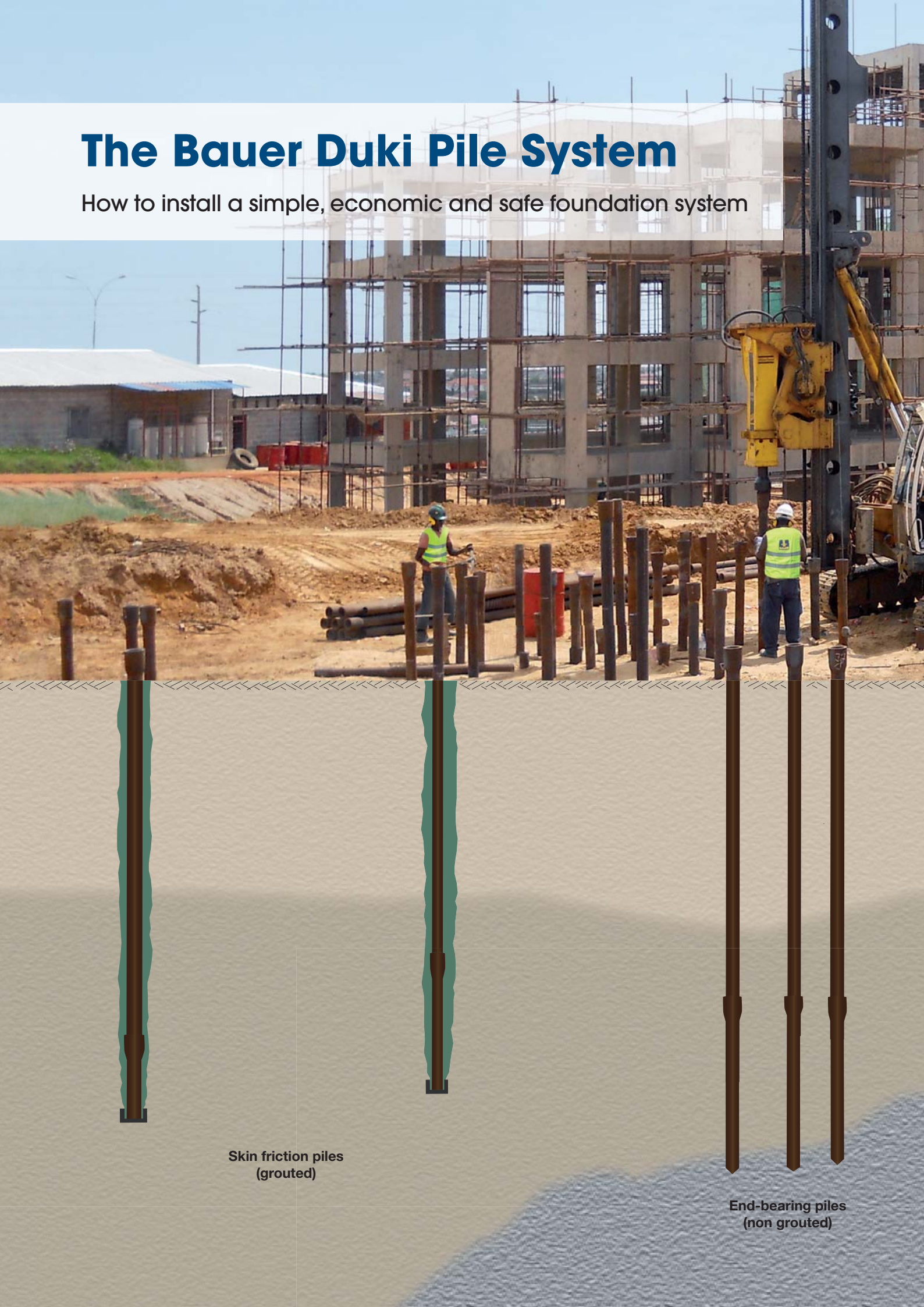


BAUER DUKI Pile System



The Bauer Duki Pile System

How to install a simple, economic and safe foundation system



Skin friction piles
(grouted)

End-bearing piles
(non grouted)



The Bauer DUKI Pile System is a simple, fast and highly effective deep foundation system. The industrially pre-fabricated piles made from high-strength ductile cast iron, guarantee high quality and a safe foundation. To execute the foundation, the individual pile sections are jointed together without using special tools to form a pile shaft of any length and vibrated into the soil by a high frequency hydraulic impact hammer. After driving, the DUKI Pile is

cut down at exactly the required length. The offcut is then reused as lead section for the next pile. The DUKI Pile is installed as either an end-bearing or skin friction pile depending on the soil characteristics. With the driving times recorded during the driving process the soil bearing capacity of the different layers can be determined. Thus, for each single pile an individual pile length can be specified to suit the local soil conditions.

**Non load-bearing
soil stratum**

**Load-bearing
soil stratum**

Rock

Advantages of the Bauer DUKI Pile System

Simple ✓

- simple site installation
- simple equipment concept
- low intensity in human resources
- minimum additional site traffic
- no drill spoil removal

Economical ✓

- low investment cost
- low time related cost
- low requirements for working platform
- no wasted cut-offs
- low wear and tear
- short construction period through high productivity

Safe ✓

- soil bearing capacity secured directly (driving criteria)
- low level of vibrations and sound emissions
- more than 30 years of experience
- more than 5 Mio. lin.m installed piles

The Bauer DUKI Pile System can be a beneficial alternative to

- stone columns
- cast-in-situ driven piles
- pre-fabricated driven piles
- micropiles
- bored piles



Application

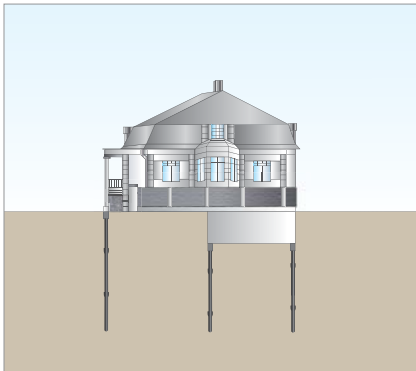
Load Bearing Capacities

	non grouted (with concrete filling)		grouted	
DUKI Pile type [mm]	C20/25	C35/45	C20/25	C35/45
Ø 118 x 7.5	709 kN	792 kN	869 kN	952 kN
Ø 118 x 9.0	842 kN	920 kN	1,001 kN	1,080 kN
Ø 170 x 9.0	1,335 kN	1,517 kN	1,566 kN	1,748 kN
Ø 170 x 10.6	1,545 kN	1,719 kN	1,776 kN	1,950 kN

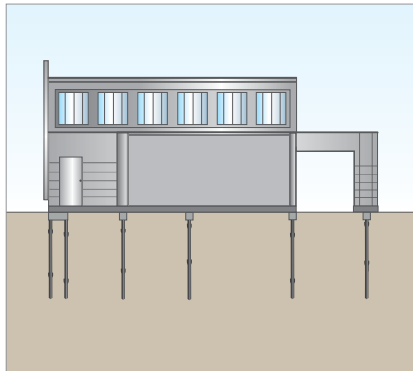
Design resistance values $R_{i,d}$ of the Ductile Pile cross section (design case permanent and temporary)

Areas of Application

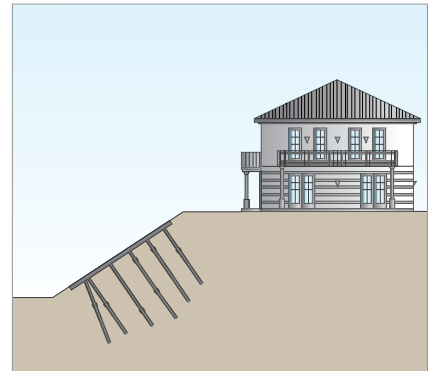
Building construction



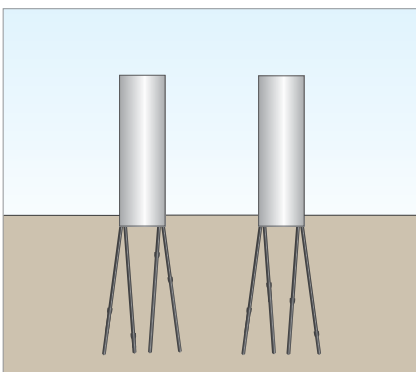
Industrial building



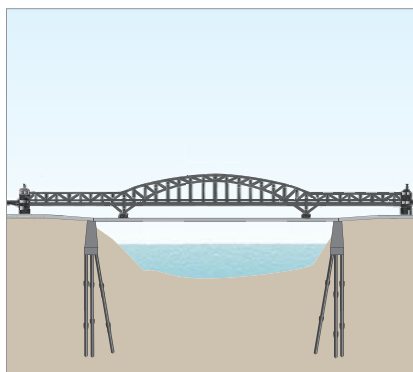
Slope protection



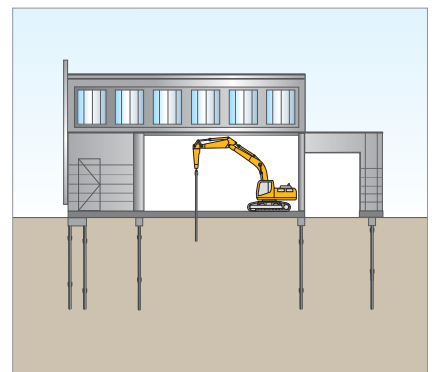
Silo foundation



Bridge construction



Refurbishment





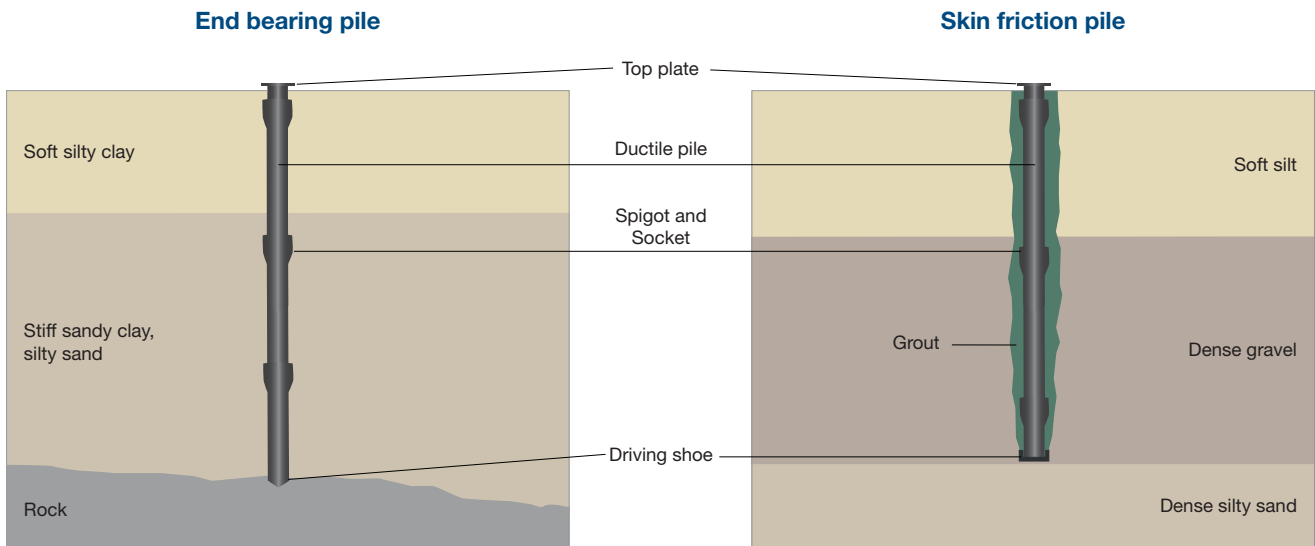
General System

As a general system there are two alternatives possible: The end bearing pile and the skin friction pile. Selection of the

suitable system is mainly on the soil conditions. Installation wise the main difference between the end bearing pile and the skin friction pile is the

grouting process required to use the skin friction for load transfer.

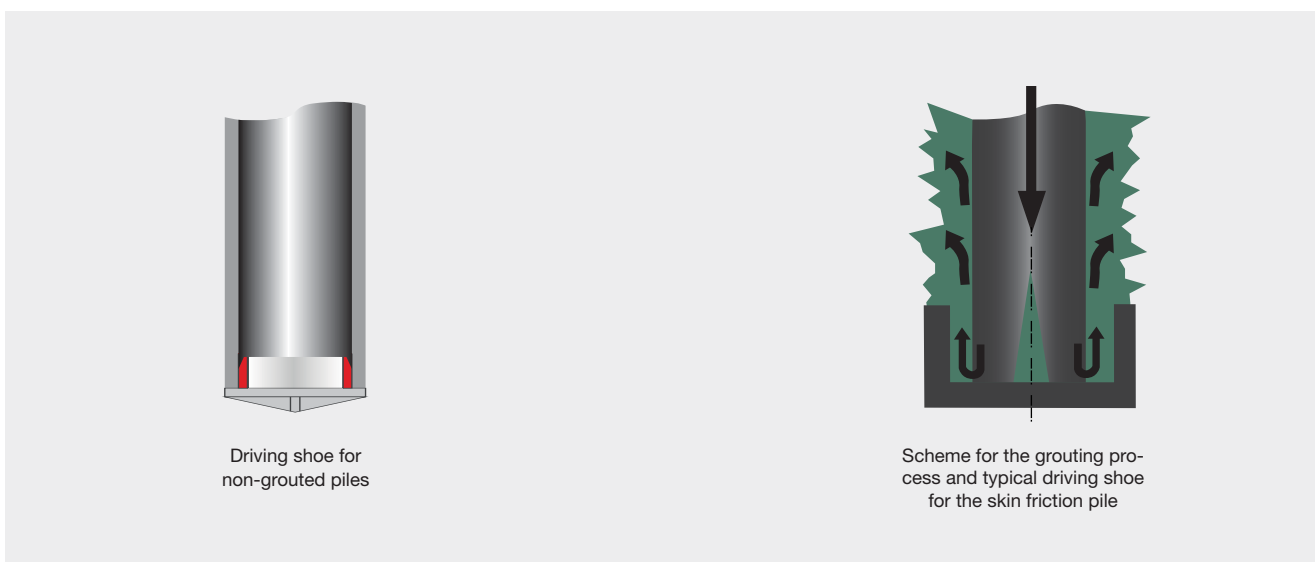
Two alternatives for the load transfer (end bearing and skin friction)



A special grouting shoe gives you the possibility to insert grout material in the annulus between pile and

surrounding soil. The driving shoes have to be chosen in accordance with the chosen pile diameter. Two

pile diameters are available, 118 mm and 170 mm.



The top plate can be chosen with the dimensions 200 x 200 x 20 mm and 250 x 250 x 40 mm, depending on

the requirements of the project. If the transfer of horizontal loads is required, inclined ductile piles can be installed.

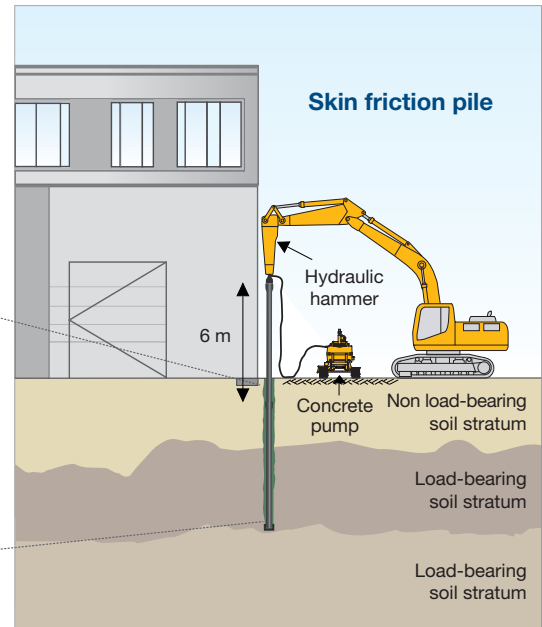
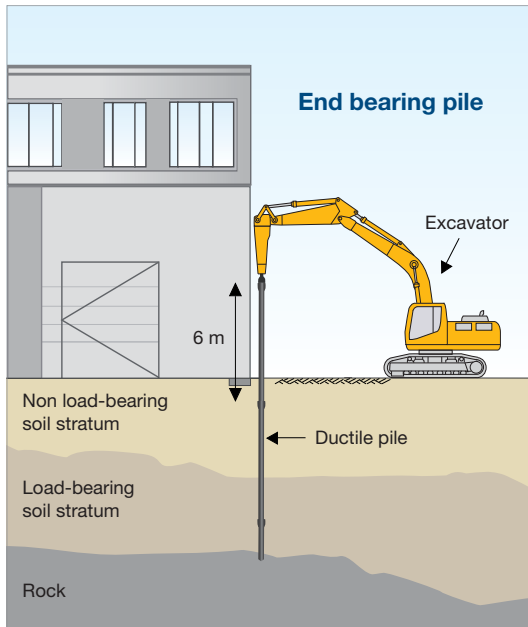
If tension loads have to be transferred into the ground, steel bars can be implemented in skin friction ductile piles.

Installation Process

Depending on the chosen alternative for the installation a hydraulic exca-

vator, a front-end loader (if possible with lifting fork), a hydraulic hammer,

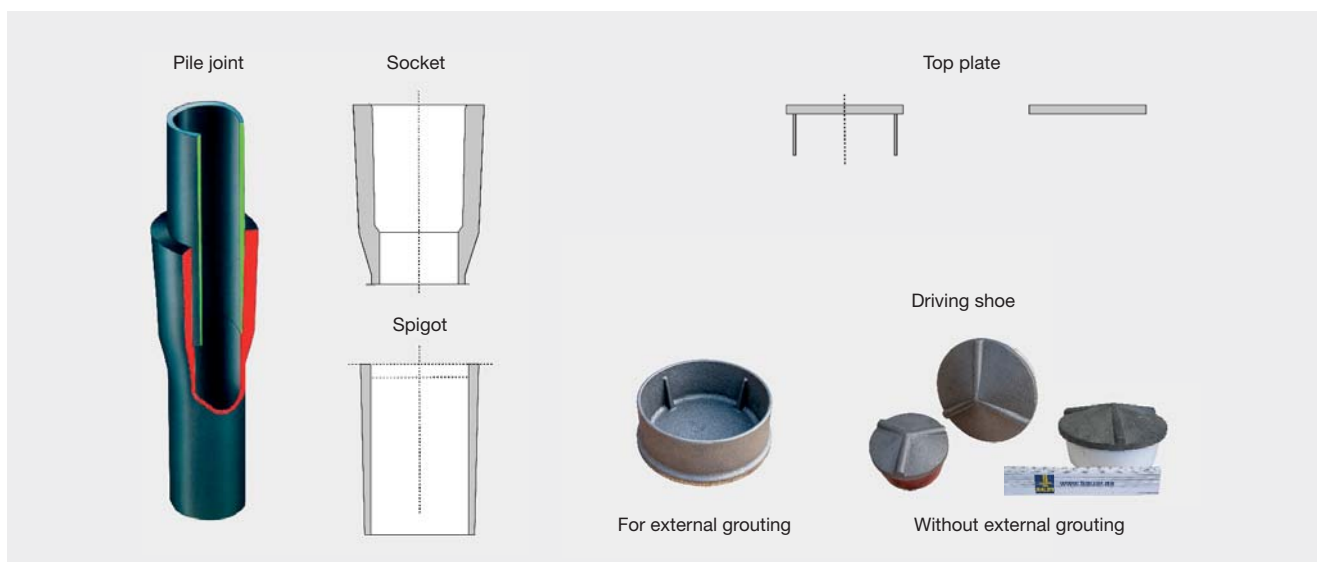
the driving adapter, a concrete piston pump and an angle grinder are required.



Each 6 m ductile pile section will be driven into the ground and if a pile with

a length bigger than 6 m is required the next pile section can be easily

connected to the already installed section via spigot and socket of the ductile piles.



If during pile driving no further penetration can be achieved, then the ultimate load capacity of the pile corresponds to the inner pile capacity. For a skin

friction pile, the ultimate load capacity corresponds to the external pile capacity. In dense to very dense non-cohesive soils and in firm to stiff cohesive

soils, pile penetration does generally not stop completely. In this case, the criterion for terminating pile driving is a penetration rate of 10 mm in 20 seconds.

Manufacturing of the Ductile Piles

The ductile piles are made in a centrifugal casting process for ductile iron.

Each pile is cast and tested using ISO 9001:2008 certified quality assurance and

control procedure. For each batch of piles, an inspection certificate is issued.



Quality and Environment

Quality Management

Based on extensive experience Bauer uses methods, equipment and techniques which allow safe execution of ductile pile projects. By deploying our professional employees on all our projects, Bauer guarantees the quality of the ductile pile works. Documentation and quality management are in accordance with the rules of DIN EN

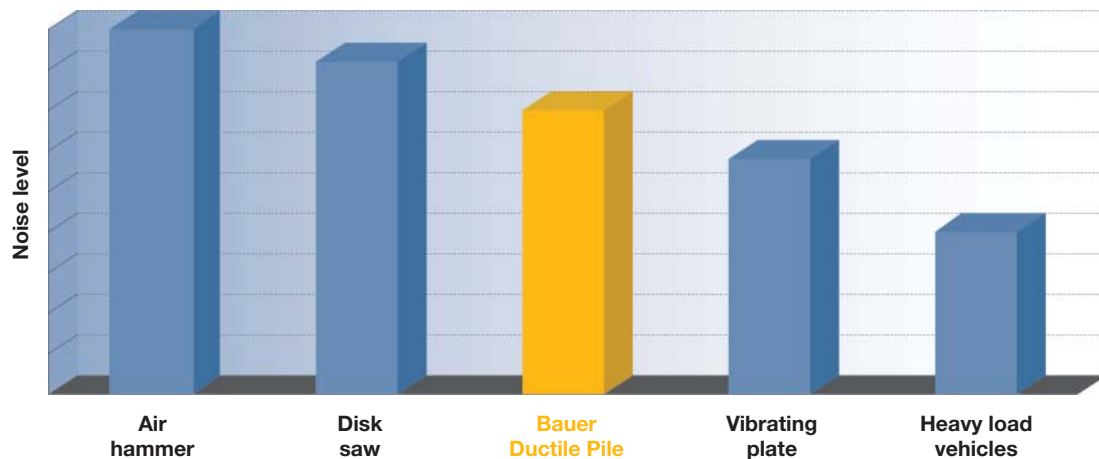
ISO 9001. Bauer supplies and installs Bauer Ductile Piles in accordance with the licence from the Deutschen Institut für Bautechnik (German Institute for Construction Technology).

Bauer is certified for environmental management according to DIN EN ISO 14001:2004.



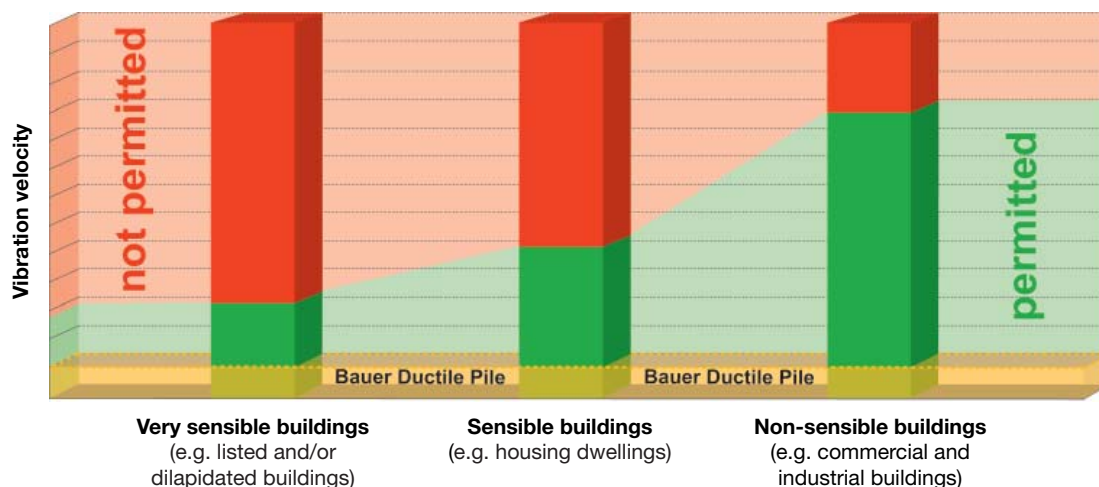
Emissions

Comparison of typical equipment on site (standard data)



Vibrations

Vibrations in accordance with DIN 4150-3:1999-02



The installation of Bauer DUKI Piles is low in noise emissions and vibrations. In general, the vibrations caused during the installation of the Bauer DUKI Pile are harmless for nearly any kind of building.

References

The Harbour at Rodney Bay, St. Lucia, West Indies

For a condominium complex in Rodney Bay, 258 nos. grouted ductile piles with 3,800 lin.m were installed by BAUER Spezialtiefbau GmbH for the Client Tropical Homes in April 2005.



Logistics Centre Kusztrich, Pötzneusiedl, Austria

For the logistics centre in Pötzneusiedl, Austria, 260 nos. ductile piles with 2,600 lin.m were installed with geothermal wires by BAUER Spezialtiefbau Ges.m.b.H. for the client Kusztrich in 2013.

Chiasso, Aldi, Switzerland

For an Aldi market in Chiasso, Switzerland, 152 nos. ductile piles with 2,250 lin.m were installed by BAUER Spezialtiefbau Schweiz AG for the client Aldi Suisse AG in 2009.





BWT Extension Plant III, Mondsee, Austria

For the Plant III extension in Mondsee, Austria, 610 nos. grouted ductile piles with 7,500 lin.m were installed by BAUER Spezialtiefbau Ges.m.b.H. for the client BWT - Best Water Technology in 2013.

Nova Vida, Angola

For the Nova Vida Housing Complex, 19,650 nos. ductile piles with 212,358 lin.m were installed by BAUER Angola Lda. for the Client INH – Instituto Nacional de Habitacao in different phases. It started in August 2010 and is still ongoing.



Boat House, Dublin, Ireland

For a boat house 50 piles of diameter 118 x 7.5 mm with a total of 600 lin.m had to be installed. The working load has been designed with 550 kN.



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